I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with § 1.6(a)(4).

Dated: December 22, 2009 Signature: /Carl A. Forest/ (Carl A. Forest)

Docket No. 020008.0112PTUS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Ofer Sneh

Application No.: 10/563,519 Confirmation No.: 8637

Filed: June 20, 2006 Art Unit: 1792

For: APPARATUS AND METHOD FOR DOWNSTREAM PRESSURE CONTROL AND SUB-ATMOSPHERIC REACTIVE GAS ABATEMENT Examiner: K.T. Chen

SUPPLEMENTAL DECLARATION OF OFER SNEH, Ph.D.

I, Ofer Sneh, hereby declare:

1. I am Founder of Sundew Technologies, LLC as well as Management Committee member and Officer of the same organization. My responsibilities include setting and executing guidelines, priorities, and road mapping of the company's technology, product development, prototyping, engineering and manufacturing, intellectual property, customer and vendor relations, and research collaboration programs. All statements made herein of my own knowledge are true, and all statements made on information and belief are believed to be true.

2. I earned a Ph.D. in chemical physics in 1992 and have worked in this technology for over eighteen years, including a number of years prior to earning my Ph.D., focusing in the area of deposition processes, and in particular atomic layer deposition (ALD). I have published more than thirty papers and presentations on the subject of

deposition processes and have more than twenty-five issued US patents in the field, and have another thirty patents pending.

3. I am an inventor in the above-identified patent application (hereinafter "the application") and Sundew Technologies, LLC (hereinafter "Sundew") is the assignee of the application.

4. I submit this Supplemental Declaration to present to the Examiner, in an authenticated manner, facts concerning the art of fluid flow restriction devices, fluid flow diffusers, and the patentability of the claims. While I will provide exhibit evidence with this declaration that the facts I present are supported by the literature, my statements are intended to be evidence in and of themselves, which, as I understand it, under the patent law must be taken as correct, unless the Examiner provides evidence contrary to these statements.

5. I have read the present claims of the application, the Office Action, and the references cited by the Examiner, i.e., US Patent No. 6,391,146 issued May 21, 2002 to Bhatnagar et al. (hereinafter "Bhatnagar et al."), US Patent No. 6,663,025 issued December 16, 2003 to Halsey et al. (hereinafter "Halsey et al."), and US Patent No. 2,028,603 issued January 21, 1936 to J.O. Heinze (hereinafter "Heinze"). I have also read United States Patent Application Publication No. 2004/0163706 of Volgysi, though the reference is no longer relevant as the claim limitations that it relates to have been removed from the claims.

6. The scientific term "flow restricting element", abbreviated as FRE, is used in the claims. The term "flow restricting element" (FRE) sometimes referred to as a "flow restrictor", is a term of art that is well known in the field of fluid flow. It means a device with no moving parts which simply restricts flow. See, for example, http://www.r-can.com/product.php?cat=24, attached hereto as Exhibit A. Those skilled in the art understand that

a flow restrictor is different from a conduit, the purpose of which is to carry fluid to another part of the system, or a chamber or compartment, the purpose of which is to provide a volume for an operation such as a reaction, a mixing, or a deposition process to take place. One skilled in the art easily understands the difference between an FRE, a conduit, and a chamber or compartment.

7. An inherent property of an FRE is that there is a substantial pressure drop across the FRE. See page 8, lines 10 – 14 of the present application. See also, for example, Exhibit B, "About Flow Orifices and Flow Restrictors", http://flow-control.gobalspec.com/LearnMore/Manufacturing_Process_Equipment/Pipe_, lines 1 and 2, and Exhibit C, Semiconductor Flow Restrictors", http://mottcorp.com/industry/semicon/flow-res.htm, page 2, figures.

8. There also must be an increase in the flow velocity across a restrictor, with the increase in flow being a function of the pressure drop. See, for example, Exhibit C, page 3, figures, and Exhibit D, United States Patent No. 6,152,162, FIG. 2 and col. 4, lines 25 – 41. See also Halsey et al., lines 58 and 59.

9. In paragraphs 19, 22, 40, and 42 of the Office Action, the Examiner says that the diffuser 200 of Halsey et al. is a flow restriction element (FRE). This is not correct. Those skilled in the art know that a diffuser is not an FRE. See Halsey et. al., which distinguishes between the diffuser 200 and a flow restrictor 416 (FIG. 4A). A gas diffuser is a device which causes a gas to spread out over a larger area, i.e., become more diffuse. A property of diffusers is that they also slow the velocity of a gas. See Halsey et al., col. 7, lines 5 – 10.

10. Thus, a diffuser acts oppositely from an FRE.

11. The Examiner says in paragraph 45 of the Office Action that his equivalence of an FRE to the device 200 in Halsey et al. and a screen 44 in Heinze is supported by the specification because the specification did not limit the definition of FRE to the devices shown in the figures. However, the specification does use FRE as known in the art. See page 26, lines 7 – 15. As shown above, those skilled in the art know what an FRE is. While the specification says that the difference between an FRE and chambers or compartments is mainly quantitative, this is no different than any other scientific definition. For example, the difference between a resistor and a conductor is mainly quantitative, but this does not prevent one skilled in the art from easily distinguishing one from the other.

12. If there be any doubt as to the definition of FRE used in the claims, I hereby state as the inventor and President of the owner of this application, with file wrapper estoppel, that the definition of FRE in the claims completely correlates to what one skilled in the art recognizes as an FRE.

13. One skilled in the art would not use a diffuser in the position of the flow restriction devices as claimed, or in any of the positions of Bhatnagar et al. alleged by the Examiner, such as in the position of the throttle valves or in front of a pump, as it would cause the gas to slow down and particles to settle out of the gas. Therefore, it would cause the device to become clogged at crucial points.

14. Halsey et al. only uses the diffuser to vent or pump out gas or to introduce gas into the process chamber. When venting or pumping gas, it does not matter if the gas slows down and particles settle out as the vented gas goes into an area external of the device. Gas that is introduced into process chambers is highly purified; thus, there are no particles to settle out.

15. Halsey et al. does not teach that the diffuser can be used in the flow stream between the process chamber and a gas treatment system, which is where the Examiner puts it in Bhatnagar et al.

16. One skilled in the art understands that a screen, in the sense used in Heinze, is a device that functions as a barrier to objects bigger than a particular size. This is consistent with the normal dictionary meaning of "screen" (see Exhibit G, Webster's New World Dictionary, Second College Edition, The World Publishing Company, New York, p. 1280), is easily understood, and one skilled in the art knows the difference between a screen and an FRE. One skilled in the art would not recognize the screen 44 in Heinze as an FRE and would not think that it would function equivalently to an FRE.

17. The pressure control apparatus as claimed in claims 1 – 11 and 16, and in particular independent claims 1, 5, and 16, has been very successful.

18. We received a National Science Foundation (NSF) grant to develop the atomic layer deposition (ALD) system as claimed in claims 1 – 11 and 16, and in particular independent claims 1, 5, and 16.

19. After the NSF grant, we have received a number of contracts from the United States government to develop the system as claimed in claims 1 – 11 and 16, and in particular independent claims 1, 5, and 16, including a contract with the Missile Defense Agency and a continuing contract with the United States Navy.

20. The Unites States Navy is currently using the system as claimed in claims 1 – 11 and 16, and in particular independent claims 1, 5, and 16, for production of high quality, highly reliable electronic devices.

21. The system as claimed in claims 1 – 11 and 16, and in particular independent claims 1, 5, and 16, is important for the development of a new level of technology that is important in integrated circuits, optics, and other areas that utilize material deposition.

22. The system as claimed in claims 1 – 11 and 16, and in particular independent claims 1, 5, and 16, is currently being used in production by several large well-known companies, though we are bound by non-disclosure agreements to not disclose the details.

23. A principal reason for the success of the system as claimed in claims 1 – 11 and 16, and in particular independent claims 1, 5, and 16, is that the pressure control system for the first time makes available an ALD system that is comparable in deposition speed to conventional chemical vapor deposition (CVD) systems.

24. The pressure control system as claimed in claims 1 – 11 and 16, and in particular independent claims 1, 5, and 16, also makes possible faster CVD systems.

25. It has been known for over fifteen years that ALD systems are capable of much improved conformal deposition which results in much higher performance and reliability. See Exhibit F, United States Patent No. 5,879,459 issued March 9, 1999 to Gadgil et al. (hereinafter "Gadgil et al."), col. 2, lines 42 – 49.

26. It has become a cliché that ALD systems are slow. See Exhibit F, http://en.wkiipedia.org/wiki/Atomic_layer_deposition, page 2, "Limitations", and Gadgil et al., col. 3, line 61 – col. 4, line 3.

27. There has been a long felt need for a faster ALD system. See Gadgil et al., col. 2, line 22 – col. 4, line 29. Gadgil seeks to solve this problem by using a stack of many small volume ALD systems. See col. 7, line 65 – col. 8, line 9. This does not make the

ALD system much faster but simply attempts to solve the problem by using many ALD systems.

28. The present invention as claimed in claims 1-11 and 16, and in particular independent claims 1, 5, and 16 solves the problem by permitting much faster pressure changes, and much faster cycling, via the pressure control system. The underlying speed of the ALD system according to the invention is increased by a factor of more than a thousand.

29. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. §1001, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

12-17-2009
Date

Ofer Sneh